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21/5/12 (Item 6 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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011159108 **Image available**
WPI Acc No: 1997-137033/199713
XRPX Acc No: N97-113136

Program module management system - has display unit which displays
result from evaluation unit, which evaluates degree of reusing
predetermined program module based on obtained rank of extracted
input-output information

Patent Assignee: MATSUSHITA ELECTRIC WORKS LTD (MATW)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
JP 9016388	A	19970117	JP 95162203	A	19950628	199713 B

Priority Applications (No Type Date): JP 95162203 A 19950628

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
JP 9016388	A	9	G06F-009/06	

Abstract (Basic): JP 9016388 A

The system has a rank setting unit (1) which changes and sets the ranking of input-output information used in a **program module** and a memory (8) stores the rank list. An indication unit (5) of an input unit (4) inputs various kinds of indications. The input-output information corresponding to a predetermined **program module** is extracted based on the input indication.

A management unit (9) obtains the rank of the extracted input-output information by referring to the stored rank list. An **evaluation unit** (10) evaluates the degree of **reusing** predetermined **program module**, based on the obtained rank of input-output information. A display unit (11) displays the **evaluation** result.

ADVANTAGE - Enables **easy** and effective utilisation and **reuse** of existing **program module** in production of new **program module**. Reduces time for extracting existing **program module**. Improves reliability.

Dwg.1/12

Title Terms: PROGRAM; MODULE; MANAGEMENT; SYSTEM; DISPLAY; UNIT; DISPLAY; RESULT; EVALUATE; UNIT; EVALUATE; DEGREE; **REUSE**; PREDETERMINED; PROGRAM; MODULE; BASED; OBTAIN; RANK; EXTRACT; INPUT; OUTPUT; INFORMATION

Derwent Class: T01

International Patent Class (Main): G06F-009/06

File Segment: EPI

22/5/1 (Item 1 from file: 2)

DIALOG(R)File 2:INSPEC

(c) 2004 Institution of Electrical Engineers. All rts. reserv.

6117284 INSPEC Abstract Number: C9902-6110B-004

Title: A component-based modeling approach

Author(s): Stritzinger, A.

Author Affiliation: Linz Univ., Austria

Conference Title: WOON. White Object-Oriented Nights. First International Conference on Object-Oriented Technology. WOON'96. and Second International Conference on Object-Oriented Technology. WOON'97. Proceedings p.208-19

Editor(s): Smolyaninov, A.V.; Shestiatynov, A.S.

Publisher: St. Petersburg Electrochem. Univ, St. Petersburg, Russia

Publication Date: 1997 Country of Publication: Russia vi+291 pp.

Material Identity Number: XX96-02115

Conference Title: Proceedings of WOON '96: 1st International Conference on Object-Oriented Technology 'The White OO Nights'

Conference Date: 20-21 June 1996; 18-19 September 1997

Conference Location: St. Petersburg, Russia

Language: English Document Type: Conference Paper (PA)

Treatment: Applications (A); Practical (P)

Abstract: This paper starts with a consolidated description of widely applied **reuse** techniques and discusses their drawbacks. As one of the most promising techniques, **component** -based **software** development is presented in more detail. Our modeling approach defines three representation techniques for capturing and documenting the essence of component systems. Each one can be represented in two forms, graphically or textually. To further **ease** modeling complex software systems, we present a general architecture model which structures a system in layers with well-defined tasks. Last, we discuss our view on the task of modeling in contrast to designing and present a **list** of modeling process activities which can be performed in any **order**. (13 Refs)

Subfile: C

Descriptors: software engineering

Identifiers: component-based modeling approach; widely applied reuse techniques; component-based software development; general architecture model

Class Codes: C6110B (Software engineering techniques); C0310F (Software development management)

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22/5/2 (Item 2 from file: 2)

DIALOG(R)File 2:INSPEC

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5253158 INSPEC Abstract Number: C9606-6110B-018

Title: Paradox no. 3: brittle software

Author(s): Bassett, P.G.

Author Affiliation: Netron Inc., Toronto, Ont., Canada

Journal: Object Magazine vol.6, no.2 p.62-3

Publisher: SIGS Publications,

Publication Date: April 1996 Country of Publication: USA

ISSN: 1055-3614

SICI: 1055-3614(199604)6:2L:62:PBS;1-W

Material Identity Number: O975-96004

Language: English Document Type: Journal Paper (JP)

Treatment: Practical (P)

Abstract: one of the least discussed issues of the software development

lifecycle, and probably the most feared, is the lack of engineering quality that typically prevents legacy systems from accepting modifications. Change forces software to flex one way, then another. The more software flexes, the more brittle and fragile it becomes. A principle concern of software engineering is to enable simple and reversible changes, while minimizing the build up of "entropy". Software entropy is the lack of **order** or coherence that ultimately saps software of its understandability, making further changes progressively more **difficult**. And brittleware is the result of all the subtle context conflicts, bugs, and inefficiencies introduced by fixes which bend, twist, and confound a system's original design. Software systems can be made to evolve in reversible ways. A principle concern of software engineering must be to enable simple and reversible changes to minimize the buildup of entropy in software. There is a way to minimize this buildup. It involves framing **software components** -packaging each data and logic structure into a generic class or frames, so that differences among polymorphs are never lost among recorded details. Each frame is a **list** of default properties, each overrideable by other frames at object construction time. What properties belong in a given frame? In a nutshell, those that get **reused** together. (2 Refs)

Subfile: C

Descriptors: object-oriented programming; software quality; software reusability

Identifiers: brittle software; software development lifecycle; engineering quality; legacy systems; reversible changes; software entropy; brittleware; software component framing; logic structure; generic class; polymorphs; default properties; object construction time

Class Codes: C6110B (Software engineering techniques); C0310F (Software development management); C6110J (Object-oriented programming)

Copyright 1996, IEE

22/5/4 (Item 4 from file: 2)

DIALOG(R)File 2:INSPEC

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5062397 INSPEC Abstract Number: C9511-6110-007

Title: An evolution-based approach to program understanding using cultural algorithms

Author(s): Reynolds, R.G.; Sverdlik, W.

Author Affiliation: Dept. of Comput. Sci., Wayne State Univ., Detroit, MI, USA

Journal: International Journal of Software Engineering and Knowledge Engineering vol.5, no.2 p.211-26

Publication Date: June 1995 Country of Publication: Singapore

CODEN: ISEKEW ISSN: 0218-1940

Language: English Document Type: Journal Paper (JP)

Treatment: Practical (P)

Abstract: Program understanding plays a very important role in the software engineering field as an essential part of the widely accepted **reuse** process. Unfortunately, the lack of general tools for this purpose often prevents users from effectively retrieving **software modules** for **reuse**. The primary **difficulty** is in determining which of the already-available modules performs the desired function. This paper explores the task of extracting functional knowledge from a program object (i.e., coded module) using an evolutionary-learning technique, cultural algorithms, to automatically learn classification rules for a **reuse** library. The modules are stored in a **reuse** library in the PM system using a faceted classification scheme. Therefore, the goal is to learn a

set of rules to characterize the semantics of code modules based on their syntactic structure. The most **difficult** part of the process is to identify those **parts** of the **program** that provide specific evidence of the presence of a concept. Here, evolutionary-learning techniques are employed to interactively identify lines in a module that are "believed" to provide evidence for the presence of a facet **value** (concept) in the code by a user. A prototype is used to learn concepts relating to the "**list**" and **-stack**" programming concepts. (26 Refs)

Subfile: C

Descriptors: genetic algorithms; learning (artificial intelligence); reverse engineering; software libraries; software maintenance; software reusability

Identifiers: evolution-based approach; program understanding; cultural algorithms; software engineering; software reuse; software tools; software module retrieval; functional knowledge; evolutionary-learning; classification rules; reuse library; code semantics; syntactic structure

Class Codes: C6110 (Systems analysis and programming); C6170K (Knowledge engineering techniques); C1180 (Optimisation techniques); C6115 (Programming support)

Copyright 1995, IEE

22/5/7 (Item 2 from file: 233)

DIALOG(R)File 233:Internet & Personal Comp. Abs.

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00262995 91PX12-021

Classix C++

Bush, Christopher E

PCM , December 1, 1991 , v9 n6 p88-90, 2 Page(s)

ISSN: 0747-0460

Company Name: Empathy

Product Name: Classix C++

Languages: English

Document Type: Software Review

Grade (of Product Reviewed): b

Hardware/Software Compatibility: IBM PC Compatible; Tandy; Turbo C++

Geographic Location: United States

Presents a favorable review of Classix C++ (\$345), a C++ programming aid from Empathy Inc. of Cambridge, MA (617). Supports the Zortech compiler; requires a Tandy/IBM compatible with Turbo C++ and 1.5 MB free space on the **hard** drive for operation. Features include detailed descriptions of each class, in-depth explanations of public/private data and their various constructors, destructors and overloaded operators as well as full source-code **listings**. Says that Classix C++, available on three 3.5-inch disks, is essentially a collection of **reusable software components** written in C++ spanning over 47 different classes, including primitive data types, complex data structures, mathematics and Smalltalk-like classes; however, its **value** to developers shall be enhanced, hopefully, with the introduction of parametrization through the PClassix pre-processing utility. (PAM)

Descriptors: Programming Aids; C Programming Language; Software Review; Consumer Information; Tandy

Identifiers: Classix C++; Empathy

? t s22/5,k/8-16,18-19

22/5,K/8 (Item 1 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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02025701 SUPPLIER NUMBER: 19046538 (USE FORMAT 7 OR 9 FOR FULL TEXT)

C++ adapted for RAD. (includes related articles on highlights, C++ development tools, Editors' Choice, performance tests, upcoming Borland C++ Builder 1.0, Watcom C++ 11.0, IBM VisualAge for C++ 4.0) (overview of three evaluations of C++ development environments) (individual evaluation records searchable under "C++ Adapted for RAD") (Software Review) (Evaluation)

Boling, Douglas

PC Magazine, v16, n3, p189(11)

Feb 4, 1997

DOCUMENT TYPE: Evaluation ISSN: 0888-8507 LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 6176 LINE COUNT: 00497

ABSTRACT: Three leading C++ development environments are reviewed. Microsoft's Visual C++ 4.2, Sybase's Optima++ Professional and IBM's VisualAge for C++ for Windows 3.5 are all very powerful packages and include elaborate suites of editing, debugging and code-optimization tools, but the packages vary in the degree to which they have implemented object orientation and rapid application development (RAD). A large gap is quickly appearing between traditional and RAD-oriented products. Visual C++ 4.2 Enterprise Edition and Optima++ 1.5 Professional are both superb development systems with specific strengths and are rated Editors' Choices. The Microsoft product ships with Microsoft Foundation Classes 4.2, remains unrivaled in system-level coding ability and supports embedded assembler. Its debugger is also very powerful. Optima++ is the most RAD-intensive program tested, providing an extensible component model, visual forms design and support for ActiveX and OCX controls.

COMPANY NAMES: Microsoft Corp.--Products; Sybase Inc.--Products

DESCRIPTORS: Application Development Software; Software Multiproduct Review

SIC CODES: 7372 Prepackaged software

TICKER SYMBOLS: MSFT; SYBS

TRADE NAMES: Microsoft Visual C++ 4.2 (Application development software)

--Evaluation; Optima++ 1.5 (Application development software)--Evaluation

FILE SEGMENT: CD File 275

... and OCX controls, and its Component Library provides some 150 prebuilt reusable components for building everything from **list** boxes to Web browsers.

Database programmers will be intrigued by Optima++'s inclusion of a PowerBuilder DataWindows...

...application development

We look for support for ActiveX or other standard components, a strong library of native **components**, and **easy programmatic** access to properties, methods, and events at design time through visual tools. We **rate** the quality of project management tools, including class browsers and object inspectors, and we assess the IDE's **ease** of use. The best tools can also create visual controls for **reuse** by inheriting from existing **components**.

System-level **programming**

Tools should support embedded assembler, COM objects, shell extensions, and system message hooks; be able to create...appears to be solid and headed for a very capable first release.

Borland C++ Builder 1.0. **List** price: Not determined at press time. Borland International, Scotts Valley, CA; 408-431-1000; fax 408-431...of

views and tools it gives you for managing projects. The Project Window gives you a traditional **listing** of all the files in a project. The Hierarchy Editor lets you model a group of classes...

...workstations. Symantec C++'s high-power debugger includes breakpoints, watches, and threads, and lets you examine assembler **listings** and memory contents. You also have good control over how individual exceptions are handled.

As it prepares...

...currently a traditional C++ tool into the newly charted world of C++ RAD.

Symantec C++ 7.5. **List** price: \$79. Symantec Corp., Cupertino, CA; 800-441-7234; fax, 541-334-7474; www.symantec.com.

Related...

...platform abilities and powerful debugging, this version of Watcom C++ continues to deliver.

Watcom C++ 11.0. **List** price: \$350. Sybase Inc., Powersoft Business Group, Concord, MA; 800-395-3525; fax, 508-287-1600; www...Preview is by far the most credible attempt we've seen.

VisualAge for C++, Version 4.0. **List** price: Not determined at press time. IBM Corp., Armonk, NY; 800-426-2255; www.software.ibm.com...

...items and performs operations such as inserting, searching, and deleting elements.

Along the same lines, the STL **List** test uses an STL **list** template class with 100 long and string items. The STL Map test examines the map vector, which...

22/5,K/9 (Item 2 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01939006 SUPPLIER NUMBER: 18287304 (USE FORMAT 7 OR 9 FOR FULL TEXT)

mTropolis. (mFactory's multimedia authoring tool) (Software Review) (Evaluation)

Milligan, Patrick

MacUser, v12, n7, p46(1)

July, 1996

DOCUMENT TYPE: Evaluation

ISSN: 0884-0997

LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 961

LINE COUNT: 00079

ABSTRACT: mFactory's \$4,995 mTropolis multimedia authoring software has enough power and flexibility to threaten the dominant **position** of Macromedia's Director in the Mac authoring market. One of its most powerful features is its drag-and-drop approach to object-oriented programming, which facilitates faster project development and troubleshooting. mTropolis makes **reusing parts of programs** extremely **easy** by distinguishing between programming instructions and the media they control. While the program only runs on Macs, it can generate programs for Macs as well as Windows systems. The majority of authoring is conducted in the Projects windows, which features the program is organized into sections and scenes. Overall, mTropolis is a promising tool for multimedia developers that demonstrates tremendous power and flexibility. It has a few rough edges and some room for improvement, which is typical in first releases.

SPECIAL FEATURES: illustration; other
COMPANY NAMES: mFactory Inc.--Products
DESCRIPTORS: Multimedia Authoring Software; Software Single Product
Review
SIC CODES: 7372 Prepackaged software
TRADE NAMES: mTropolis (Multimedia authoring software)--Evaluation
FILE SEGMENT: CD File 275

ABSTRACT: mFactory's \$4,995 mTropolis multimedia authoring software has enough power and flexibility to threaten the dominant **position** of Macromedia's Director in the Mac authoring market. One of its most powerful features is its drag-and-drop approach to object-oriented programming, which facilitates faster project development and troubleshooting. mTropolis makes **reusing parts of programs** extremely **easy** by distinguishing between programming instructions and the media they control. While the program only runs on Macs...
... to squash the bugs and continue adding enhancements, mTropolis may prove irresistible.

mTropolis 1.0, \$4,995 (**list**). Company: mFactory, Burlingame, CA;
415-548-0600; <http://ww.mfactory.com/>.

22/5,K/10 (Item 3 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)
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01538956 SUPPLIER NUMBER: 12326103 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Sweet testing suite. (Novell's LANalyzer network analyzer) (Software Review) (Test Drive) (includes related articles on product features and price and on LANalyzer for NetWare) (Evaluation)
Hurwicz, Mike
LAN Magazine, v7, n7, p152(6)
July, 1992
DOCUMENT TYPE: Evaluation ISSN: 0898-0012 LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 3692 LINE COUNT: 00288

ABSTRACT: Novell Inc's \$12,500 Ethernet or Token Ring LANalyzer 3.11 network analyzer is a reliable, trouble-free product that encourages its use through predefined test suites, taking much of the burden off of a network manager. LANalyzer has 175 test suites geared toward single problems or **groups** of problems; users can easily create their own test suites as well. In spite of its function-key based user interface, LANalyzer is **easy** to use and **reuse**. Users can create patterns for building LANalyzer applications, templates that put patterns in a packet, channels that look at the data stream in a particularized manner and filters that define packets on each channel. Triggers start and stop packet capture, data collection parameters tell the **program** which **parts** of a packet to save, and alarm thresholds log and give messages for exceeded bandwidth or packet **rate**. LANalyzer is very strong in protocol analysis as well as traffic or security monitoring. Installation is simple and the documentation is useful.

SPECIAL FEATURES: illustration; photograph
COMPANY NAMES: Novell Inc.--Products
DESCRIPTORS: LAN Monitor; Software Packages; Evaluation
SIC CODES: 7372 Prepackaged software
TICKER SYMBOLS: NOVL
TRADE NAMES: LANalyzer 3.11a (Network analyzer)--evaluation

OPERATING PLATFORM: TCP/IP; NetWare; VINES; AppleTalk; SNA; OSI; DECnet;
X-Windows; Ethernet; Token-Ring
FILE SEGMENT: CD File 275

...ABSTRACT: the burden off of a network manager. LANalyzer has 175 test suites geared toward single problems or **groups** of problems; users can easily create their own test suites as well. In spite of its function-key based user interface, LANalyzer is **easy** to use and **reuse**. Users can create patterns for building LANalyzer applications, templates that put patterns in a packet, channels that...
...that define packets on each channel. Triggers start and stop packet capture, data collection parameters tell the **program** which **parts** of a packet to save, and alarm thresholds log and give messages for exceeded bandwidth or packet **rate**. LANalyzer is very strong in protocol analysis as well as traffic or security monitoring. Installation is simple...
... has a field labeled "AC FC." The manual explains what it means, but "AC FC" is not **listed** in the index. I had to look up the appropriate screen and then page through in order...

...to push, however. Most functions are triggered via function keys. The purpose of each function key is **listed** at the bottom of the screen, and the help screens give you more detail on the purpose...

22/5,K/11 (Item 4 from file: 275)
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01536391 SUPPLIER NUMBER: 12687421 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Component-oriented software development.
Nierstrasz, Oscar; Gibbs, Simon; Tsichritzis, Dennis
Communications of the ACM, v35, n9, p160(6)
Sept, 1992
ISSN: 0001-0782 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 4318 LINE COUNT: 00369

ABSTRACT: Components-based software engineering is still a dream but may be closer to realization now that object-oriented languages are available. Frameworks can be revised so that open applications can be constructed in a modular style rather than programmed in the traditional sense. The trend is indicated by increasingly open typologies, the evolution of modern applications and the growth of an organizational paradigm for decomposing large applications into cooperating objects. Today's object-oriented languages emphasize programming rather than application composition from prepackaged components and offer no support for a component-oriented software development approach; the current object-oriented approach places an emphasis on debugging rather than on composition and reuse.

SPECIAL FEATURES: illustration; table; chart
DESCRIPTORS: Object-Oriented Programming; Software Engineering; Modular Programming; Applications; Object-Oriented Languages; Program Development Techniques; New Technique
SIC CODES: 7372 Prepackaged software
FILE SEGMENT: CD File 275

... process (D). In Figure 1, software-based media objects are shown with shading, hardware-based without. A **list** of the port descriptions of these objects is provided in Table 1.

One benefit of flow-based...a single, specific application. One must

acquire domain knowledge, factor out functionality, anticipate future requirements, develop reusable **software components**, package the results for generations of future application developers, evaluate the **ease** with which new applications can be composed, and iterate. It is necessarily an evolutionary process. **Reusable** object classes are like poems--it is **easy** to talk about them, but it is **hard** to write a good one ! The second problem has to do with the way software is packaged...

...for interoperability of object-oriented applications are only now being explored. Present-day project management practices discourage **reuse** by leaving little room for capital investment in **reusable** software. Existing software is **reused** only if it is part of the basic environment, if it is free, or if it constitutes...

...a database). New approaches to software licensing and exchange of software information are needed if developers of **reusable** software are to receive a return on their investments.

References

1. Ader, M., Nierstrasz, O., McMahon, S...

22/5,K/12 (Item 5 from file: 275)

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01520576 SUPPLIER NUMBER: 12324113 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Rewards and reuse. (the benefits of reusing software designs and models)(Peopleware) (Column)

Constantine, Larry

Computer Language, v9, n7, p104(4)

July, 1992

DOCUMENT TYPE: Column ISSN: 0749-2839 LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 2002 LINE COUNT: 00157

ABSTRACT: Reusing software designs and models provides many benefits and increases programmer productivity; large component libraries could support high levels of **reuse** and double or triple effective productivity. Most programmers like to program, however, and they would generally rather design and build from scratch than **reuse** software because they believe they can improve on it by making it tighter, faster or more elegant. **Reuse** on a measurable scale starts with **reusable** component libraries, but it is uncertain how the component libraries will be created. It has been **difficult** to convince programmers to donate their code to such libraries because they either want to get paid or want to be assured they will not be responsible for updates or maintenance. Some companies have formed **groups** of full-time developers for creating components for **reuse**; the goals of the projects and obstacles that must be overcome are discussed.

DESCRIPTORS: Program Library; Reusable Code; Programming Management;
Application Development Software; Trends; Product Development; User Need;
Software Design; Industry Analysis
SIC CODES: 7372 Prepackaged software
FILE SEGMENT: CD File 275

...ABSTRACT: and models provides many benefits and increases programmer productivity; large component libraries could support high levels of **reuse** and double or triple effective productivity. Most programmers like to

program, however, and they would generally rather design and build from scratch than **reuse** software because they believe they can improve on it by making it tighter, faster or more elegant. **Reuse** on a measurable scale starts with **reusable** component libraries, but it is uncertain how the component libraries will be created. It has been **difficult** to convince programmers to donate their code to such libraries because they either want to get paid...

...want to be assured they will not be responsible for updates or maintenance. Some companies have formed **groups** of full-time developers for creating components for **reuse**; the goals of the projects and obstacles that must be overcome are discussed.

... Incentives. Market forces. Rewards schemes. Royalties. Reinforcement schedules. Culture change." Such lovely cacophony.

It really is not **hard** to understand the **score**. **Reuse** on any substantial scale begins with **reusable** component libraries. Only two basic problems are really involved in such libraries: getting things into them and getting things out again! For **programmers** to **reuse** **components** from a library, components must first be in the library. Where do these come from?

Various models...authors not only in response to sensed needs or demands, but also to round out the book **list** for more complete coverage and to anticipate future needs. This model, or Page-Jones's idea of...

22/5,K/13 (Item 6 from file: 275)
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01515880 SUPPLIER NUMBER: 12160988 (USE FORMAT 7 OR 9 FOR FULL TEXT)
OOP at work: balancing costs, benefits. (object-oriented programming)
Coffee, Peter
PC Week, v9, n20, p131(4)
May 18, 1992
ISSN: 0740-1604 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 2983 LINE COUNT: 00237

ABSTRACT: More than 1,000 developers attended Borland International Inc's 1992 Developers' Conference specifically in search of guidelines for object-oriented programming (OOP) techniques and assurance that adopting OOP would be worth the effort. Compilers and tools for both standard and proprietary OOP languages are increasing in popularity, but building a case for OOP is more difficult from a business point of view because OOP requires intelligent planning and strong design and coding skills on the **part** of **programmers** and analysts. Many of the strengths ascribed to OOP come essentially from supportive operating environments, according to Smalltalk pioneer Adele Goldberg. Object-oriented programs are not necessarily easier to write than procedural programs, and they require precise documentation in **order** for code to be **reused**. Specification processes must be brought closer to actual coding to realize the benefits of OOP. Debugging is potentially easier in an OOP system because individual objects can be debugged in advance. Many programmers say that hidden bugs are more likely to show up prior to a project's release if OOP is used; many different parts of an OOP program access the same piece of code. Bug prevention and end-user needs are discussed.

SPECIAL FEATURES: illustration; table
DESCRIPTORS: Object-oriented programming; Program Development Techniques;

Programming Management; Guidelines; User Need; Performance/Cost
Relationship
FILE SEGMENT: CD File 275

...ABSTRACT: business point of view because OOP requires intelligent planning and strong design and coding skills on the **part** of **programmers** and analysts. Many of the strengths ascribed to OOP come essentially from supportive operating environments, according to...

...oriented programs are not necessarily easier to write than procedural programs, and they require precise documentation in **order** for code to be **reused**. Specification processes must be brought closer to actual coding to realize the benefits of OOP. Debugging is...

... they generally offer more functionality than their non-object-oriented brethren."

These claims raise a long **list** of questions: Are object-oriented programs easier to write than programs written in conventional languages, even when...

22/5,K/14 (Item 7 from file: 275)
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01511064 SUPPLIER NUMBER: 12068454 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Exploiting reusable specifications through analogy. (computer-aided software engineering tool support for software specification reuse)
(Technical)

Maiden, Neil A.; Sutcliffe, Alistair G.
Communications of the ACM, v35, n4, p55(10)
April, 1992

DOCUMENT TYPE: Technical ISSN: 0001-0782 LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 6479 LINE COUNT: 00585

ABSTRACT: The potential of specification reuse by analogy and its benefits for requirements analysis are studied, and a technique for specification reuse is developed; implications for computer-aided software engineering (CASE) tool support are examined. Two examples of analogical reuse are described to define analogy and show the potential benefits of reuse, empirical studies of analogical reuse behavior are summarized to determine requirements for an intelligent reuse advisor, the advisor's underlying architecture and philosophy are described, and a partial prototype of the advisor is developed. The three major components of the intelligent reuse advisor (Ira) are the problem identifier, the analogy engine and the specification advisor; each is described.

SPECIAL FEATURES: illustration; chart

DESCRIPTORS: Reusable Code; Research and Development; Program Development Techniques; New Technique; Specifications; Prototype; Analogies; Computer-aided software engineering

FILE SEGMENT: CD File 275

... in price. Theater staff use the system to reply to inquiries and to manage reservations. A waiting **list** is created whenever a performance is overbooked, and theater goers are transferred from the waiting **list** to seats when cancellations are made. The context data flow diagram for this theater reservation system is...

...either course, each of which has an upper limit of places in any academic year. A waiting **list** is used for additional students who cannot be offered places immediately. Students on the waiting **list** have first option on any places which become available due to cancellations. The context data flow diagram...

...theater-goer-students in different domains, the two systems share significant surface features (e.g., reservations, waiting **lists**, places) which assist analogical recognition and understanding. Alternative analogies with the theater reservation and course administration domains... from these studies are reported more fully in [20].

Potential Benefits from

Successful Specification Reuse

Successful specification **reuse** can help to overcome **difficulties** encountered by inexperienced software engineers during early stages of software development. Formation of mental models are necessary for domain-understanding. As reported, however, mental model formation can be error-prone and **difficult** [29]. In addition, problem-scoping was important in determining success for inexperienced software engineers [20]. Analogical specifications can provide them with relevant domain models with similar boundaries to assist problem-scoping. Analogical **reuse** could also reduce the software engineer's mental load during this period of model formation. Evaluating candidate designs in new scenarios is a key **element** in successful **software** development; analogical specification could provide alternative scenarios for evaluating new specifications. Finally, specification **reuse** will inevitably encourage a more prototypical approach to requirements analysis, as suggested by [1]. Prototyping in turn may encourage more frequent **evaluation** of requirement specifications, implying greater, indirect benefits from specification **reuse**. A cautionary note, however, should be sounded; dependence on specification **reuse** can discourage innovation, and bring about the mental laziness we are seeking to avoid.

Successful specification reuse...

22/5,K/15 (Item 8 from file: 275)

DIALOG(R)File 275:Gale Group Computer DB(TM)

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01436319 SUPPLIER NUMBER: 10704469 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Building a foundation for the future of software engineering.

(International Conference on Software Engineering special report;

overview to five articles on technical material presented at ICSE-12)

Freeman, Peter A.; Gaudel, Marie-Claude
Communications of the ACM, v34, n5, p30(4)
May, 1991

ISSN: 0001-0782

LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 1293 LINE COUNT: 00107

ABSTRACT: The annual International Conference on Software Engineering (ICSE) brings together specialists from many fields, including computer science, management, psychology, design and economics. ICSE-12 was held in Nice, France in March 1990. Topics covered at ICSE meetings include reports on basic research, analyses of past projects and suggestions for applications of technology in the future. The aim of the conference is to improve communications among professionals in the different fields. The five papers included in this special report have been revised and updated since the conference and are a representative sample of the best technical

material presented at ICSE-12.

DESCRIPTORS: Conferences and Meetings; Reports; International Conference on Software Engineering 12; Trade and Professional Associations; Software Engineering

SIC CODES: 8611 Business associations

FILE SEGMENT: CD File 275

TEXT:

...a wide range of activities, from basic research that will not be applied for years, to the **assessment** of past development projects from which we hope to learn, to the application of techniques for future...

...is of interest both to software engineers (since it addresses invisibility which is one of the major **difficulties** in the development, **reuse** and maintenance of software) and to AI researchers (since it presents and details an important case study...

...to extract and capture information about a system architecture. The article by Gabrielian and Franklin addresses the **difficult** problem of formal specification of real-time systems. A specification consists of a basic nondeterministic machine and of an ordered **list** of other machines which express constraints on the behavior of the future system. The authors' approach combines...

...Their article discusses a method for structuring such specifications. This method has the advantage of allowing some **reuse**. Moreover, the authors provide a method for verifying that such a specification is consistent with respect to...

...of the transitions of the plan. (Verifying properties of real-time systems at the specification level is **difficult** in full generality.) This article also gives an interesting solution for liveness issues. Lafontaine, Ledru and Schobbens...

...the formalization in B of the VDM development is independent of the case study and can be **reused** for other problems. Another interesting by-product is the possibility of **reusing** parts of proven formal developments. It turned out that B alone is not sufficient and that more...

...the authors demonstrate that supporting formal development is now feasible, even if it is not yet as **easy** as it must be some day for widespread use. Wileden, Wolf, Rosenblatt and Tarr propose a solution for an old, yet important, problem in software development and **reuse**: the interoperability of components developed in different languages and/or running on different machines. Their article presents a guided tour of various existing approaches for making heterogeneous **software components** communicate. The authors then present their own approach, which is based on the notion of abstract data Prieto-Diaz discusses the implementation of a classification scheme for **reuse** --a topic of strong current interest. The method he describes is a **reuse** program based on a library of **reusable** software assets. In addition to the conclusions the author draws from this practical application (i.e., the...

...the articles in this special issue help to continue and expand the all-important communication that takes **place** at conferences like ICSE. By presenting a sample of that communication within the software-engineering community to...

22/5,K/16 (Item 9 from file: 275)

DIALOG(R) File 275:Gale Group Computer DB(TM)

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01305542 SUPPLIER NUMBER: 07742771 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Utilities and languages. (listings of software programs) (directory)

DG Review, v7, n1, p4(7)

Summer, 1989

DOCUMENT TYPE: directory ISSN: 1050-9127 LANGUAGE: ENGLISH

RECORD TYPE: FULLTEXT; ABSTRACT

WORD COUNT: 8309 LINE COUNT: 00734

ABSTRACT: A directory of utility and language software packages, grouped by specific applications, is given. The program **listings** include product name and price, vendor name, a brief description of the product and information concerning the product's hardware, operating system and language requirements. The categories **listed** include communications, fourth-generation languages, operating system enhancements, program development aids, program generators, programming languages, report generators, screen editors-formatters and utilities.

DESCRIPTORS: Directories; Desktop Utility; Fourth-Generation Language; Operating System; Application Development Software; Program Generators; Programming Language; Report Generation Software; Vendors; Screen Generators/Formatters

SIC CODES: 7372 Prepackaged software

FILE SEGMENT: CD File 275

Utilities and languages. (listings of software programs) (directory)

ABSTRACT: A directory of utility and language software packages, grouped by specific applications, is given. The program **listings** include product name and price, vendor name, a brief description of the product and information concerning the product's hardware, operating system and language requirements. The categories **listed** include communications, fourth-generation languages, operating system enhancements, program development aids, program generators, programming languages, report generators...

... reports when contiguous space is near exhaustion so users know when to reorganize. All contiguous files are **listed** with the percentage of allocated space in use for XD and NX portions. AUTOMAX automatically suggests new...

...compatible across the entire spectrum of minicomputer and microcomputer hardware supported by BLIS/COBOL. (See PC/BLIS **listing** below for additional information about BLIS for the IBM PC/XT.) Price: "Per User" pricing (\$390-\$6...users, or nine BLIS/COBOL users and one DOS user concurrently. (For additional information, see BLIS/COBOL **listing** above.) Price: \$800 plus \$398/user (two-user minimum) CPU: IBM PC and compatibles Operating Systems: BLIS...898-4183 DATALYNX, INC. Application: Profile access and control Product Name: Guardian Description: Guardian is a sophisticated, **easy** -to-use profile access and control system which simplifies and tightens security for AOS/VS systems. Guardian requires users to change passwords on a regular basis, refuses to allow old passwords to be **reused** and can generate new passwords that are **easy** to remember. User access can be restricted by time or membership in a **group** . Using one screen, the system manager can control 47 profile privileges. A complete set of reports is...

...and is fast enough to be run on a daily basis. It is fully menu-driven for **ease** of use and interactive to provide feedback to users. Features include analysis mode, fast PCOPY-type dump...

...manager for ICObOL under AOS or AOS/VS Product Name: PRINTMGR+PRINTVUE
Description: PRINTMGR is a print **queue** management tool for ICObOL users who have upgraded to AOS or AOS/VS. PRINTMGR is an **easy** -to-use, flexible replacement for P.A.S.S. facility existing within ICObOL under RDOS and ICOS
...

...of print job status; control of printer from any terminal; alignment and printing of any file with **ease** . PRINTVUE enhances PRINTMGR by providing several ways of viewing a file before printing; examine last few pages...

...name as required under MS-DOS, and I/O device name translation. A best-fit translation in **difficult** situations is provided, and user diagnostics and warnings are inserted when appropriate. Price: Contact vendor CPU: DG...mail, call CLI and more. All of these functions are available without modifying or even recompiling existing **programs** . Other **routines** are provided to allow COBOL programs to use overlapping windows with minimal programming. Other programs may be...

22/5,K/18 (Item 1 from file: 674)
DIALOG(R)File 674:Computer News Fulltext
(c) 2004 IDG Communications. All rts. reserv.

093536

Bowstreet jumps into portals

Company promises customized access to Web-based content.

Byline: JENNIFER MEARS

Journal: Network World Page Number: 57

Publication Date: May 07, 2001

Word Count: 671 Line Count: 65

Text:

... technology to automate the process of managing and creating Web-based applications and services, has joined the **list** of software vendors that have jumped into the portal market in recent months. The company last week ...

...as XML to integrate Web services. The Business Web factory automates the process of creating Web-based **applications** because **programmed components** are stored and can be **reused** , eliminating the need to code changes every time, says Steve Chazin, Bowstreet's director of marketing. The portal product includes point-and-click wizards that make it **easy** for non-IT business managers to make changes, freeing developers to focus on creating models of links...

... platform is becoming more important than the portal interface, says Larry Hawes, an analyst with the Delphi **Group** . That's why it's not surprising to see companies such as Bowstreet, and other e-platform...

... the market differently from Bowstreet, offering static products that aggregate content and services and have to be **hard** -coded for customization. "All of the portal vendors grew up in a world trying to emulate a...

22/5,K/19 (Item 2 from file: 674)
DIALOG(R)File 674:Computer News Fulltext
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093407

Bowstreet promises easy portal customization

Byline: JENNIFER MEARS

Journal: Network World

Publication Date: April 30, 2001

Word Count: 675 Line Count: 65

Text:

... technology to automate the process of managing and creating Web-based applications and services, has joined the **'list'** of software vendors that have jumped into the portal market in recent months. This week, the company ...

...as XML to integrate Web services. The Business Web factory automates the process of creating Web-based **applications** because **programmed components** are stored and can be **reused**, eliminating the need to code changes every time, says Steve Chazin, Bowstreet's director of marketing. The portal product includes point-and-click wizards that make it **easy** for non-IT business managers to make changes, freeing developers to focus on creating models of links...

... platform is becoming more important than the portal interface, says Larry Hawes, an analyst with the Delphi **Group**. That's why it's not surprising to see companies such as Bowstreet, and other e-platform...

... the market differently from Bowstreet, offering static products that aggregate content and services and have to be **hard**-coded for customization. "All of the portal vendors grew up in a world trying to emulate a...

Set	Items	Description
S1	1301504	SOFTWARE OR APPLICATION? OR PROGRAM?
S2	6939447	COMPONENT? ? OR PART? ? OR ELEMENT? ? OR ROUTINE? ? OR MOD- ULE? ?
S3	51596	REUSE? OR REUSING OR REUSAB?
S4	2594426	WEIGHT? OR SCORE? OR SCORING OR GRADE? OR EVALUATION OR AS- SESSMENT OR VALUE OR RATE? OR RATING
S5	3790199	RANK? OR GROUP? OR POSITION OR PLACE OR STANDING OR ORDER - OR QUEUE OR QUEUED OR QUEUING OR QUEUEING
S6	559437	EASE? OR EASINESS OR EFFORTLESSNESS OR EASY
S7	308511	HARD OR DIFFICULT? OR ARDUOUS OR LABORIOUS
S8	1733	RESTRUCTUR? OR (ALTER OR CHANG???) () STRUCTURE?
S9	30759	S1 (2N) S2
S10	300	S9 AND S3
S11	98939	S4 AND (S6 OR S7)
S12	3	S10 AND S11
S13	81	S8 (3N) S2
S14	1	S10 AND S13
S15	0	S11 AND S13
S16	1	S10 AND S8
S17	13	S9 AND S8
S18	1480	S9 AND (S6 OR S7)
S19	1	S18 AND S8
S20	16	S12 OR S14 OR S16 OR S17 OR S19
S21	15	S20 AND IC=G06F?

File 347:JAPIO Nov 1976-2004/Apr(Updated 040802)

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File 350:Derwent WPIX 1963-2004/UD,UM &UP=200453

(c) 2004 Thomson Derwent

S1 1301504 SOFTWARE OR APPLICATION? OR PROGRAM?
S2 6939447 COMPONENT? ? OR PART? ? OR ELEMENT? ? OR ROUTINE? ? OR MOD-
ULE? ?
S3 51596 REUSE? OR REUSING OR REUSAB?
S4 2594426 WEIGHT? OR SCORE? OR SCORING OR GRADE? OR EVALUATION OR AS-
SESSMENT OR VALUE OR RATE? OR RATING
S5 3790199 RANK? OR GROUP? OR POSITION OR PLACE OR STANDING OR ORDER -
OR QUEUE OR QUEUED OR QUEUING OR QUEUEING
S6 559437 EASE? OR EASINESS OR EFFORTLESSNESS OR EASY
S7 308511 HARD OR DIFFICULT? OR ARDUOUS OR LABORIOUS
S8 1733 RESTRUCTUR? OR (ALTER OR CHANG???) () STRUCTURE?

Set	Items	Description
S1	11092350	SOFTWARE OR APPLICATION? OR PROGRAM?
S2	10619263	COMPONENT? ? OR PART? ? OR ELEMENT? ? OR ROUTINE? ? OR MOD- ULE? ?
S3	149191	REUSE? OR REUSING OR REUSAB?
S4	11629052	WEIGHT? OR SCORE? OR SCORING OR GRADE? OR EVALUATION OR AS- SESSMENT OR VALUE OR RATE? OR RATING
S5	10375503	RANK? OR GROUP? OR POSITION OR PLACE OR STANDING OR ORDER - OR QUEUE OR QUEUED OR QUEUING OR QUEUEING
S6	702091	EASE? OR EASINESS OR EFFORTLESSNESS OR EASY
S7	1712882	HARD OR DIFFICULT? OR ARDUOUS OR LABORIOUS
S8	92343	RESTRUCTUR? OR (ALTER OR CHANG???) () STRUCTURE?
S9	243491	S1 (2N) S2
S10	7658	S9 (S) S3
S11	407001	S4 (S) (S6 OR S7)
S12	392976	S5 (S) (S6 OR S7)
S13	89	S10 (S) S11
S14	184	S10 (S) S12
S15	14244	S8 (S) S2
S16	0	S13 (S) S15
S17	0	S13 (S) S8
S18	0	S14 (S) S8
S19	249	S13 OR S14
S20	194	S19 NOT PY>2001
S21	30	S20 AND LIST?
S22	21	S21 NOT PD>20010531
File	2:INSPEC 1969-2004/Aug W2	(c) 2004 Institution of Electrical Engineers
File	6:NTIS 1964-2004/Aug W3	(c) 2004 NTIS, Intl Cpyrght All Rights Res
File	8:Ei Compendex(R) 1970-2004/Aug W2	(c) 2004 Elsevier Eng. Info. Inc.
File	34:SciSearch(R) Cited Ref Sci 1990-2004/Aug W3	(c) 2004 Inst for Sci Info
File	35:Dissertation Abs Online 1861-2004/Jul	(c) 2004 ProQuest Info&Learning
File	65:Inside Conferences 1993-2004/Aug W3	(c) 2004 BLDSC all rts. reserv.
File	92:IHS Intl.Stds.& Specs. 1999/Nov	(c) 1999 Information Handling Services
File	94:JICST-EPlus 1985-2004/Jul W4	(c)2004 Japan Science and Tech Corp(JST)
File	95:TEME-Technology & Management 1989-2004/Jun W1	(c) 2004 FIZ TECHNIK
File	99:Wilson Appl. Sci & Tech Abs 1983-2004/Jul	(c) 2004 The HW Wilson Co.
File	103:Energy SciTec 1974-2004/Aug B1	(c) 2004 Contains copyrighted material
File	144:Pascal 1973-2004/Aug W2	(c) 2004 INIST/CNRS
File	202:Info. Sci. & Tech. Abs. 1966-2004/Jul 12	(c) 2004 EBSCO Publishing
File	233:Internet & Personal Comp. Abs. 1981-2003/Sep	(c) 2003 EBSCO Pub.
File	239:Mathsci 1940-2004/Oct	(c) 2004 American Mathematical Society
File	275:Gale Group Computer DB(TM) 1983-2004/Aug 19	(c) 2004 The Gale Group
File	434:SciSearch(R) Cited Ref Sci 1974-1989/Dec	(c) 1998 Inst for Sci Info

File 647: CMP Computer Fulltext 1988-2004/Aug W2
(c) 2004 CMP Media, LLC
File 674: Computer News Fulltext 1989-2004/Jul W4
(c) 2004 IDG Communications
File 696: DIALOG Telecom. Newsletters 1995-2004/Aug 18
(c) 2004 The Dialog Corp.

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] An information rank grant means to hierarchize and rank the I/O information used for a program module, An input means to have the directions input section which inputs various kinds of directions, and an information filing means to grasp the rank of the I/O information based on the rank by the information rank grant means while extracting the I/O information of a predetermined program module based on directions of this input means, The program module managerial system characterized by providing an assessment means to evaluate whenever [reuse / of a predetermined program module] based on the rank of the I/O information grasped with this information filing means, and a display means to display the assessment result of this assessment means.

[Claim 2] The program module managerial system according to claim 1 characterized by preparing the graph display which graph-izes relation between I/O information and its rank for said display means.

[Claim 3] The program module managerial system according to claim 1 or 2 characterized by forming so that the retrieval result of this retrieval means may be displayed with a display means while establishing a storage means to memorize many program modules, and a retrieval means to search a related program module from a storage means based on the I/O information inputted with the input means.

[Claim 4] The program module managerial system according to claim 1 to 3 characterized by preparing the Management Department which makes additional correction based on the directions which inputted the I/O information which hierarchized for said information rank grant means, and was ranked and made into it with the input means.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the program module managerial system which aims at reuse of the program module which constitutes software.

[0002]

[Description of the Prior Art] Conventionally, as for the program module which constitutes the software created at the time of program development, it is common to be saved with the I/O specification in which the content is shown. This I/O specification describes the content of the output data which bring input data for performing the I/O information of a program module, i.e., a program module, and its activation result. And when creating a program module newly, the saved I/O specification is searched, the program module which is consulted is extracted, and it is reused. Retrieval of this I/O specification is performed from the identifier of a program module and I/O information using the help or the computer.

[0003]

[Problem(s) to be Solved by the Invention] As mentioned above, increase in efficiency is in drawing by creation of a program module searching with I/O specification the program module created in the past, and referring to it. However, since the program module to which it refers is searched by the program module of I/O specification, and the identifier of I/O information, it cannot necessarily say it as the optimal program module. Therefore, retrieval of I/O specification extracted two or more program modules, and in order to take the procedure of choosing the optimal thing from the inside of it by the help, selection of the program module to reuse had taken time amount.

[0004] This invention is what was made in view of this reason, and the place made into the object is offering the program module managerial system which makes reuse of a program module easy.

[0005]

[Means for Solving the Problem] In order to solve this technical problem, a program module managerial system according to claim 1 An information rank grant means to hierarchize and rank the I/O information used for a program module, An input means to have the directions input section which inputs various kinds of directions, and an information filing means to grasp the rank of the I/O information based on the rank by the information rank grant means while extracting the I/O information of a predetermined program module based on directions of this input means, It is considering as the configuration possessing an assessment means to evaluate whenever [reuse / of a predetermined program module] based on the rank of the I/O information grasped with this information filing means, and a display means to display the assessment result of this assessment means.

[0006] Moreover, the program module managerial system according to claim 2 is considered as the configuration which prepared the graph display which graph-izes relation between I/O information and its rank for a display means according to claim 1.

[0007] Moreover, a program module managerial system according to claim 3 is considered as the configuration formed so that the retrieval result of this retrieval means might be displayed with a display means while it establishes a storage means to memorize many program modules to a program module managerial system according to claim 1 or 2, and a retrieval means to search a related program module from a storage means based on the I/O information inputted with the input means.

[0008] Moreover, the program module managerial system according to claim 4 is considered as the configuration which prepared the Management Department which makes additional correction based on

the directions which inputted the I/O information which hierarchized for the information rank grant means according to claim 1 to 3, and was ranked and made into it with the input means.

[0009]

[Function] According to the configuration according to claim 1, since it is ranked and whenever [reuse / of the program module] is quantitatively estimated by the assessment means based on it, the assessment of the I/O information of a predetermined program module is intelligible, and in case it is creation of a new program module, it can be used efficiently.

[0010] Moreover, according to the configuration according to claim 2, since relation between I/O information and its rank is graph-ized by the graph display in addition to an operation of claim 1, assessment becomes intelligible still more visually.

[0011] Moreover, in order to search [according to the configuration according to claim 3] a related program module based on the I/O information inputted with the input means from many program modules in addition to an operation of claims 1 or 2, the time amount which the extract of the program module to reuse takes is shortened.

[0012] Moreover, since the additional correction of the I/O information which was hierarchized, and was ranked and carried out with the information rank grant means is made [according to the configuration according to claim 4] in addition to an operation of claim 1 thru/or either of 3, it becomes what has the still higher injury dependability with a rank of I/O information.

[0013]

[Example] Hereafter, the 1st example of this invention is explained based on drawing 1 thru/or drawing 8. Drawing 1 is the block diagram of a program module managerial system, and is the information rank grant means 1. Input means 4 Storage means 8 Information filing means 9 The assessment means 10 and the display means 11 are used as the main configuration member.

[0014] Information rank grant means 1 The I/O information used for many program modules is hierarchized and ranked, and it is the hierarchization section 2. Rank grant section 3 It has. Hierarchization section 2 I/O information is hierarchized, and in this example, as shown in information system drawing as shown in drawing 2, it hierarchizes. This information system drawing is what hierarchized I/O information, i.e., input data, and output data according to that detail and concreteness, and it is positioned in a low-ranking hierarchy, so that it becomes concrete. Specifically, the I/O information of [in the I/O information of / in the I/O information of "temperature" / a "room temperature" to the 1st hierarchy] a "floor temperature" to the 2nd hierarchy of the 1st hierarchy's low order positions the I/O information of a "inlet-port floor temperature" to the 3rd hierarchy of the 2nd hierarchy's low order to the 4th hierarchy of the 3rd hierarchy's low order. And according to a hierarchy, a number "1", "1.1", "1.1.1", etc. are given to each I/O information. This hierarchization section 2 A storage means 8 to mention later Information system drawing is memorized beforehand, the need is accepted, and it is the storage means 8. It forms so that information system drawing may be read. In addition, information system drawing is an input means 4 to mention later, without memorizing beforehand. It uses and you may make it create. Moreover, the existing classification tables, such as a patent classification, can also be used for this information system drawing.

[0015] the rank grant section 3 The hierarchization section 2 the hierarchized I/O information is ranked and it considers as as high a rank as the hierarchy who refers to a number and is located in low order -- as shown in the information rank table of drawing 3, a rank 2 and the 3rd hierarchy consider as a rank 3, and, specifically, the 4th hierarchy considers a rank 1 and the 2nd hierarchy for the 1st hierarchy as a rank 4. The information rank table which is the result of ranking and carrying out in the rank grant section 3 is a storage means 8 to mention later. It memorizes and is the information filing means 9. It is referred to.

[0016] Input means 4 Various kinds of directions, data, etc. are inputted and it is the directions input section 5. Module input section 6 It has and is formed from a keyboard, a mouse, an image reader, etc. Directions input section 5 An instruction for various kinds of directions, i.e., this program module managerial system, to operate is inputted, and it is the directions input section 5. The inputted directions are inputted into the information rank grant means 1, the information filing means 9, the assessment means 10, and display means 11 grade. Module input section 6 The created program module is inputted and it is the module input section 6. The inputted program module is a storage means 8 to mention later. It is inputted.

[0017] storage means 8 The hierarchization section 2 Information system drawing and the rank grant

section 3 an information rank table, many program modules, etc. are memorized, and it forms by RAM etc. -- having -- the need -- responding -- information filing means 9 etc. -- the content of storage is outputted.

[0018] Information filing means 9 Input means 4 Directions input section 5 While extracting the I/O information of a predetermined program module based on the inputted directions, the rank of the I/O information is grasped based on the rank by the information rank grant means 1. Specifically, it is the information filing means 9. Directions input section 5 From the identifier of the inputted program module, it is the storage means 8. A related program module is searched. And the I/O information of the related program module is extracted, and it is the storage means 8. The rank of the I/O information is grasped from the information rank table memorized. Drawing 4 is the information filing means 9. It is an I/O information rank list of grasped program modules, and this grasped rank is inputted into an assessment means 10 to mention later. In addition, drawing 5 is the source list of the searched program module.

[0019] The assessment means 10 is the information filing means 9. Based on the rank of the grasped I/O information, whenever [reuse / of the program module which has the I/O information] is evaluated. Whenever [reuse] is expressed with the number of I/O information, the sum total of a rank, the average of a rank, the maximum of a rank, the minimum value of a rank, and the width of face of a rank, and the assessment means 10 computes these values for every program module, and, specifically, outputs them to the display means 11 as an assessment result.

[0020] The display means 11 displays the assessment result evaluated by the assessment means 10, and is formed with CRT, a liquid crystal display, etc. Drawing 6 shows an example of a display of the display means 11, and has become the display which chooses a program module, the display which chooses evaluation criteria next, and the last with the display of an assessment result first.

[0021] Next, actuation of this program module managerial system is explained. First, information rank grant means 1 It has and the hierarchization and the rank of I/O information which are generally used for a program module are performed. Next, input means 4 It is based on the directions inputted and is the information filing means 9. Storage means 8 A related program module is searched, the I/O information of the program module is extracted, and it is the information rank grant means 1 about the rank of I/O information. It grasps based on a rank. Furthermore, the assessment means 10 evaluates whenever [reuse / of the program module which consists of the number of I/O information, the sum total of a rank, etc.] based on the rank, and expresses it as the display means 11. Moreover, many program modules are the storage means 8. Although it memorizes beforehand, it is the input means 4. It inputs and is the storage means 8. It is memorizable.

[0022] Drawing 6 is an example of a display of the display means 11, as mentioned above, but first, when deciding on and limiting whether a program module is limited, it inputs the identifier "ABC" included in the program module. When not limiting, it is the storage means 8. All the program modules memorized are applicable. Next, evaluation criteria are inputted. In the case of the number of I/O information, the case of this is "2" at the sum total of "1" and a rank, and, in the case of all items, "9" is inputted. Thus, by inputting, a program module including an identifier "ABC" is searched and the assessment result for every evaluation criteria of the is displayed.

[0023] Since it can use efficiently in case that assessment of a program module managerial system is intelligible since the I/O information of a predetermined program module is ranked and whenever [reuse / of that program module] is quantitatively estimated by the assessment means based on it, and this thing is creation of a new program module, reuse of a program module becomes easy. In addition, a rank's being high is that the program module is materialized, and it will be generalized that a rank is low. Moreover, when the rank of the I/O information currently used is scattering, it can be estimated that it is the program module which is hard to use it.

[0024] Drawing 7 and drawing 8 are the modifications of the 1st example, and form the graph display 12 in the display means 11. I/O information is displayed on an axis of abscissa, and the graph display 12 displays the rank on an axis of ordinate, as relation between I/O information and its rank is graph-ized and is shown in drawing 8.

[0025] Since relation between I/O information and its rank is graph-ized by the graph display 12 and assessment becomes intelligible still more visually, it becomes still easier to reuse [of a program module] this thing.

[0026] Next, the 2nd example of this invention is explained based on drawing 9 and drawing 10. This

thing can perform retrieval of the program module by I/O information.

[0027] Input means 1 It sets and is 7. The I/O information which a program module [is the information input section and] to search has is inputted. This inputted I/O information is inputted into the retrieval means mentioned later.

[0028] 13 is a retrieval means and is the information input section 7. It is based on the inputted I/O information and is the storage means 8 about a related program module. It searches. And the I/O information and the information input section 7 of the program module Whenever [matching / of the inputted I/O information] is computed. Whenever [this matching] is [I/O information and] the information input section 7 of a program module. The number corresponding [I/O information's inputted] is shown. This retrieval result is outputted to the display means 11.

[0029] Although drawing 10 is an example of a display of the display means 11, when deciding on and limiting whether a program module is limited, it inputs first the identifier "ABC" included in the program module. When not limiting, it is the storage means 8. All the program modules memorized are applicable. Next, a retrieval item is inputted. This inputs an identifier, for example, "ABCD", "MNOP", etc. of I/O information. Thus, by inputting, the program module included before the name of the I/O information is searched, and whenever [matching] is displayed as the retrieval result. In addition, the information input section 7 when an identifier is not thoroughly in agreement and a part's corresponds It can turn out that the inputted I/O information of a part corresponds whenever [matching] like 0.5 when the I/O information of a program module is "AB" in "ABCD."

[0030] This thing is the input means 4 from many program modules. Since the time amount which the extract of the program module to reuse takes is shortened in order to search a related program module based on the inputted I/O information, it is efficient.

[0031] Next, the 3rd example of this invention is explained based on drawing 11 and drawing 12. This thing can perform additional correction of the ranked I/O information.

[0032] Information rank grant means 1 It sets, 13 is the Management Department and it is the input means 4. Directions input section 5 Based on the inputted directions, it hierarchizes, and it ranks and the made additional correction of I/O information is made. As shown in drawing 12, specifically, the Management Department 13 is the hierarchization section 2. The additional correction of the information system drawing is made, and, in an addition, it is the directions input section 5. Directions are inputted and it is the information input section 7 about new I/O information. Information system drawing is added by inputting and inputting the hierarchy by the number. Moreover, in correction, similarly, it is the directions input section 5. It is the information input section 7 about the I/O information which inputs and corrects directions. Information system drawing is corrected by inputting. In addition, when additional correction etc. is made for information system drawing, it is the rank grant section 3. A rank redoes.

[0033] This thing is the information rank grant means 1. It hierarchizes, it ranks, and since the additional correction of the I/O information carried out is made and it becomes what has the still higher injury dependability with a rank of I/O information, it much more becomes easy to reuse a program module.

[0034] In addition, although the program module was beforehand memorized for the storage means, you may make it evaluate whenever [reuse] to the program module inputted with the input means. Moreover, although the display means displayed the assessment result and the retrieval result, of course, it can perform enabling it to display information system drawing, an information rank table, a source list, etc.

[0035]

[Effect of the Invention] Since the I/O information of a predetermined program module is ranked and whenever [reuse / of the program module] is quantitatively estimated by the assessment means based on it, the assessment of a program module managerial system according to claim 1 is intelligible, and since it can use efficiently in case it is creation of a new program module, reuse of a program module becomes easy.

[0036] Moreover, since relation between I/O information and its rank is graph-ized by the graph display in addition to the effectiveness of claim 1 and assessment becomes intelligible still more visually, it becomes still easier to reuse [of a program module] a program module managerial system according to claim 2.

[0037] Moreover, since the time amount which the extract of the program module to reuse takes is shortened in order to search a related program module based on the I/O information inputted with the

input means from many program modules in addition to the effectiveness of claims 1 or 2, the program module managerial system according to claim 3 is efficient.

[0038] Moreover, since a program module managerial system according to claim 4 makes the additional correction of the I/O information which was hierarchized, and was ranked and carried out with the information rank grant means in addition to the effectiveness of claim 1 thru/or either of 3 and it becomes what has the still higher injury dependability with a rank of I/O information, it much more becomes easy to reuse a program module.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the program module managerial system which aims at reuse of the program module which constitutes software.

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PRIOR ART

[Description of the Prior Art] Conventionally, as for the program module which constitutes the software created at the time of program development, it is common to be saved with the I/O specification in which the content is shown. This I/O specification describes the content of the output data which bring input data for performing the I/O information of a program module, i.e., a program module, and its activation result. And when creating a program module newly, the saved I/O specification is searched, the program module which is consulted is extracted, and it is reused. Retrieval of this I/O specification is performed from the identifier of a program module and I/O information using the help or the computer.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the I/O information of a predetermined program module is ranked and whenever [reuse / of the program module] is quantitatively estimated by the assessment means based on it, the assessment of a program module managerial system according to claim 1 is intelligible, and since it can use efficiently in case it is creation of a new program module, reuse of a program module becomes easy.

[0036] Moreover, since relation between I/O information and its rank is graph-ized by the graph display in addition to the effectiveness of claim 1 and assessment becomes intelligible still more visually, it becomes still easier to reuse [of a program module] a program module managerial system according to claim 2.

[0037] Moreover, since the time amount which the extract of the program module to reuse takes is shortened in order to search a related program module based on the I/O information inputted with the input means from many program modules in addition to the effectiveness of claims 1 or 2, the program module managerial system according to claim 3 is efficient.

[0038] Moreover, since a program module managerial system according to claim 4 makes the additional correction of the I/O information which was hierarchized, and was ranked and carried out with the information rank grant means in addition to the effectiveness of claim 1 thru/or either of 3 and it becomes what has the still higher injury dependability with a rank of I/O information, it much more becomes easy to reuse a program module.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] As mentioned above, increase in efficiency is in drawing by creation of a program module searching with I/O specification the program module created in the past, and referring to it. However, since the program module to which it refers is searched by the program module of I/O specification, and the identifier of I/O information, it cannot necessarily say it as the optimal program module. Therefore, retrieval of I/O specification extracted two or more program modules, and in order to take the procedure of choosing the optimal thing from the inside of it by the help, selection of the program module to reuse had taken time amount.

[0004] This invention is what was made in view of this reason, and the place made into the object is offering the program module managerial system which makes reuse of a program module easy.

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MEANS

[Means for Solving the Problem] In order to solve this technical problem, a program module managerial system according to claim 1 An information rank grant means to hierarchize and rank the I/O information used for a program module, An input means to have the directions input section which inputs various kinds of directions, and an information filing means to grasp the rank of the I/O information based on the rank by the information rank grant means while extracting the I/O information of a predetermined program module based on directions of this input means, It is considering as the configuration possessing an assessment means to evaluate whenever [reuse / of a predetermined program module] based on the rank of the I/O information grasped with this information filing means, and a display means to display the assessment result of this assessment means.

[0006] Moreover, the program module managerial system according to claim 2 is considered as the configuration which prepared the graph display which graph-izes relation between I/O information and its rank for a display means according to claim 1.

[0007] Moreover, a program module managerial system according to claim 3 is considered as the configuration formed so that the retrieval result of this retrieval means might be displayed with a display means while it establishes a storage means to memorize many program modules to a program module managerial system according to claim 1 or 2, and a retrieval means to search a related program module from a storage means based on the I/O information inputted with the input means.

[0008] Moreover, the program module managerial system according to claim 4 is considered as the configuration which prepared the Management Department which makes additional correction based on the directions which inputted the I/O information which hierarchized for the information rank grant means according to claim 1 to 3, and was ranked and made into it with the input means.

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OPERATION

[Function] According to the configuration according to claim 1, since it is ranked and whenever [reuse / of the program module] is quantitatively estimated by the assessment means based on it, the assessment of the I/O information of a predetermined program module is intelligible, and in case it is creation of a new program module, it can be used efficiently.

[0010] Moreover, according to the configuration according to claim 2, since relation between I/O information and its rank is graph-ized by the graph display in addition to an operation of claim 1, assessment becomes intelligible still more visually.

[0011] Moreover, in order to search [according to the configuration according to claim 3] a related program module based on the I/O information inputted with the input means from many program modules in addition to an operation of claims 1 or 2, the time amount which the extract of the program module to reuse takes is shortened.

[0012] Moreover, since the additional correction of the I/O information which was hierarchized, and was ranked and carried out with the information rank grant means is made [according to the configuration according to claim 4] in addition to an operation of claim 1 thru/or either of 3, it becomes what has the still higher injury dependability with a rank of I/O information.

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EXAMPLE

[Example] Hereafter, the 1st example of this invention is explained based on drawing 1 thru/or drawing 8 . Drawing 1 is the block diagram of a program module managerial system, and is the information rank grant means 1. Input means 4 Storage means 8 Information filing means 9 The assessment means 10 and the display means 11 are used as the main configuration member.

[0014] Information rank grant means 1 The I/O information used for many program modules is hierarchized and ranked, and it is the hierarchization section 2. Rank grant section 3 It has. Hierarchization section 2 I/O information is hierarchized, and in this example, as shown in information system drawing as shown in drawing 2 , it hierarchizes. This information system drawing is what hierarchized I/O information, i.e., input data, and output data according to that detail and concreteness, and it is positioned in a low-ranking hierarchy, so that it becomes concrete. Specifically, the I/O information of [in the I/O information of / in the I/O information of "temperature" / a "room temperature" to the 1st hierarchy] a "floor temperature" to the 2nd hierarchy of the 1st hierarchy's low order positions the I/O information of a "inlet-port floor temperature" to the 3rd hierarchy of the 2nd hierarchy's low order to the 4th hierarchy of the 3rd hierarchy's low order. And according to a hierarchy, a number "1", "1.1", "1.1.1", etc. are given to each I/O information. This hierarchization section 2 A storage means 8 to mention later Information system drawing is memorized beforehand, the need is accepted, and it is the storage means 8. It forms so that information system drawing may be read. In addition, information system drawing is an input means 4 to mention later, without memorizing beforehand. It uses and you may make it create. Moreover, the existing classification tables, such as a patent classification, can also be used for this information system drawing.

[0015] the rank grant section 3 The hierarchization section 2 the hierarchized I/O information is ranked and it considers as as high a rank as the hierarchy who refers to a number and is located in low order -- as shown in the information rank table of drawing 3 , a rank 2 and the 3rd hierarchy consider as a rank 3, and, specifically, the 4th hierarchy considers a rank 1 and the 2nd hierarchy for the 1st hierarchy as a rank 4. The information rank table which is the result of ranking and carrying out in the rank grant section 3 is a storage means 8 to mention later. It memorizes and is the information filing means 9. It is referred to.

[0016] Input means 4 Various kinds of directions, data, etc. are inputted and it is the directions input section 5. Module input section 6 It has and is formed from a keyboard, a mouse, an image reader, etc. Directions input section 5 An instruction for various kinds of directions, i.e., this program module managerial system, to operate is inputted, and it is the directions input section 5. The inputted directions are inputted into the information rank grant means 1, the information filing means 9, the assessment means 10, and display means 11 grade. Module input section 6 The created program module is inputted and it is the module input section 6. The inputted program module is a storage means 8 to mention later. It is inputted.

[0017] storage means 8 The hierarchization section 2 Information system drawing and the rank grant section 3 an information rank table, many program modules, etc. are memorized, and it forms by RAM etc. -- having -- the need -- responding -- information filing means 9 etc. -- the content of storage is outputted.

[0018] Information filing means 9 Input means 4 Directions input section 5 While extracting the I/O information of a predetermined program module based on the inputted directions, the rank of the I/O information is grasped based on the rank by the information rank grant means 1. Specifically, it is the

information filing means 9. Directions input section 5 From the identifier of the inputted program module, it is the storage means 8. A related program module is searched. And the I/O information of the related program module is extracted, and it is the storage means 8. The rank of the I/O information is grasped from the information rank table memorized. Drawing 4 is the information filing means 9. It is an I/O information rank list of grasped program modules, and this grasped rank is inputted into an assessment means 10 to mention later. In addition, drawing 5 is the source list of the searched program module.

[0019] The assessment means 10 is the information filing means 9. Based on the rank of the grasped I/O information, whenever [reuse / of the program module which has the I/O information] is evaluated. Whenever [reuse] is expressed with the number of I/O information, the sum total of a rank, the average of a rank, the maximum of a rank, the minimum value of a rank, and the width of face of a rank, and the assessment means 10 computes these values for every program module, and, specifically, outputs them to the display means 11 as an assessment result.

[0020] The display means 11 displays the assessment result evaluated by the assessment means 10, and is formed with CRT, a liquid crystal display, etc. Drawing 6 shows an example of a display of the display means 11, and has become the display which chooses a program module, the display which chooses evaluation criteria next, and the last with the display of an assessment result first.

[0021] Next, actuation of this program module managerial system is explained. First, information rank grant means 1 It has and the hierarchization and the rank of I/O information which are generally used for a program module are performed. Next, input means 4 It is based on the directions inputted and is the information filing means 9. Storage means 8 A related program module is searched, the I/O information of the program module is extracted, and it is the information rank grant means 1 about the rank of I/O information. It grasps based on a rank. Furthermore, the assessment means 10 evaluates whenever [reuse / of the program module which consists of the number of I/O information, the sum total of a rank, etc.] based on the rank, and expresses it as the display means 11. Moreover, many program modules are the storage means 8. Although it memorizes beforehand, it is the input means 4. It inputs and is the storage means 8. It is memorizable.

[0022] Drawing 6 is an example of a display of the display means 11, as mentioned above, but first, when deciding on and limiting whether a program module is limited, it inputs the identifier "ABC" included in the program module. When not limiting, it is the storage means 8. All the program modules memorized are applicable. Next, evaluation criteria are inputted. In the case of the number of I/O information, the case of this is "2" at the sum total of "1" and a rank, and, in the case of all items, "9" is inputted. Thus, by inputting, a program module including an identifier "ABC" is searched and the assessment result for every evaluation criteria of the is displayed.

[0023] Since it can use efficiently in case that assessment of a program module managerial system is intelligible since the I/O information of a predetermined program module is ranked and whenever [reuse / of that program module] is quantitatively estimated by the assessment means based on it, and this thing is creation of a new program module, reuse of a program module becomes easy. In addition, a rank's being high is that the program module is materialized, and it will be generalized that a rank is low. Moreover, when the rank of the I/O information currently used is scattering, it can be estimated that it is the program module which is hard to use it.

[0024] Drawing 7 and drawing 8 are the modifications of the 1st example, and form the graph display 12 in the display means 11. I/O information is displayed on an axis of abscissa, and the graph display 12 displays the rank on an axis of ordinate, as relation between I/O information and its rank is graph-ized and is shown in drawing 8 .

[0025] Since relation between I/O information and its rank is graph-ized by the graph display 12 and assessment becomes intelligible still more visually, it becomes still easier to reuse [of a program module] this thing.

[0026] Next, the 2nd example of this invention is explained based on drawing 9 and drawing 10. This thing can perform retrieval of the program module by I/O information.

[0027] Input means 1 It sets and is 7. The I/O information which a program module [is the information input section and] to search has is inputted. This inputted I/O information is inputted into the retrieval means mentioned later.

[0028] 13 is a retrieval means and is the information input section 7. It is based on the inputted I/O information and is the storage means 8 about a related program module. It searches. And the I/O

information and the information input section 7 of the program module Whenever [matching / of the inputted I/O information] is computed. Whenever [this matching] is [I/O information and] the information input section 7 of a program module. The number corresponding [I/O information's inputted] is shown. This retrieval result is outputted to the display means 11.

[0029] Although drawing 10 is an example of a display of the display means 11, when deciding on and limiting whether a program module is limited, it inputs first the identifier "ABC" included in the program module. When not limiting, it is the storage means 8. All the program modules memorized are applicable. Next, a retrieval item is inputted. This inputs an identifier, for example, "ABCD", "MNOP", etc. of I/O information. Thus, by inputting, the program module included before the name of the I/O information is searched, and whenever [matching] is displayed as the retrieval result. In addition, the information input section 7 when an identifier is not thoroughly in agreement and a part's corresponds It can turn out that the inputted I/O information of a part corresponds whenever [matching] like 0.5 when the I/O information of a program module is "AB" in "ABCD."

[0030] This thing is the input means 4 from many program modules. Since the time amount which the extract of the program module to reuse takes is shortened in order to search a related program module based on the inputted I/O information, it is efficient.

[0031] Next, the 3rd example of this invention is explained based on drawing 11 and drawing 12. This thing can perform additional correction of the ranked I/O information.

[0032] Information rank grant means 1 It sets, 13 is the Management Department and it is the input means 4. Directions input section 5 Based on the inputted directions, it hierarchizes, and it ranks and the made additional correction of I/O information is made. As shown in drawing 12, specifically, the Management Department 13 is the hierarchization section 2. The additional correction of the information system drawing is made, and, in an addition, it is the directions input section 5. Directions are inputted and it is the information input section 7 about new I/O information. Information system drawing is added by inputting and inputting the hierarchy by the number. Moreover, in correction, similarly, it is the directions input section 5. It is the information input section 7 about the I/O information which inputs and corrects directions. Information system drawing is corrected by inputting. In addition, when additional correction etc. is made for information system drawing, it is the rank grant section 3. A rank redoes.

[0033] This thing is the information rank grant means 1. It hierarchizes, it ranks, and since the additional correction of the I/O information carried out is made and it becomes what has the still higher injury dependability with a rank of I/O information, it much more becomes easy to reuse a program module.

[0034] In addition, although the program module was beforehand memorized for the storage means, you may make it evaluate whenever [reuse] to the program module inputted with the input means. Moreover, although the display means displayed the assessment result and the retrieval result, of course, it can perform enabling it to display information system drawing, an information rank table, a source list, etc.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of the program module managerial system in which the 1st example of this invention is shown.

[Drawing 2] It is information system drawing showing an example which hierarchized the I/O information.

[Drawing 3] It is the information rank table which ranked and carried out I/O information from the information system drawing.

[Drawing 4] It is an I/O information rank list of program modules grasped with the information filing means.

[Drawing 5] It is the source list of the program module.

[Drawing 6] It is an example of the display result of the display means.

[Drawing 7] It is the block diagram of the display means which shows the modification of the 1st example.

[Drawing 8] It is an example of the display result of the display means.

[Drawing 9] It is the block diagram of the program module managerial system in which the 2nd example of this invention is shown.

[Drawing 10] It is an example of the display result of the display means.

[Drawing 11] It is the block diagram of the information rank grant means of a program module managerial system which shows the 3rd example of this invention.

[Drawing 12] It is the flow chart which shows a part of actuation of the program module managerial system.

[Description of Notations]

1 Information Rank Grant Means

2 Hierarchization Section

3 Rank Grant Means

4 Input Means

5 Directions Input Section

6 Module Input Section

7 Information Input Section

8 Storage Means

9 Information Filing Means

10 Assessment Means

11 Display Means

[Translation done.]